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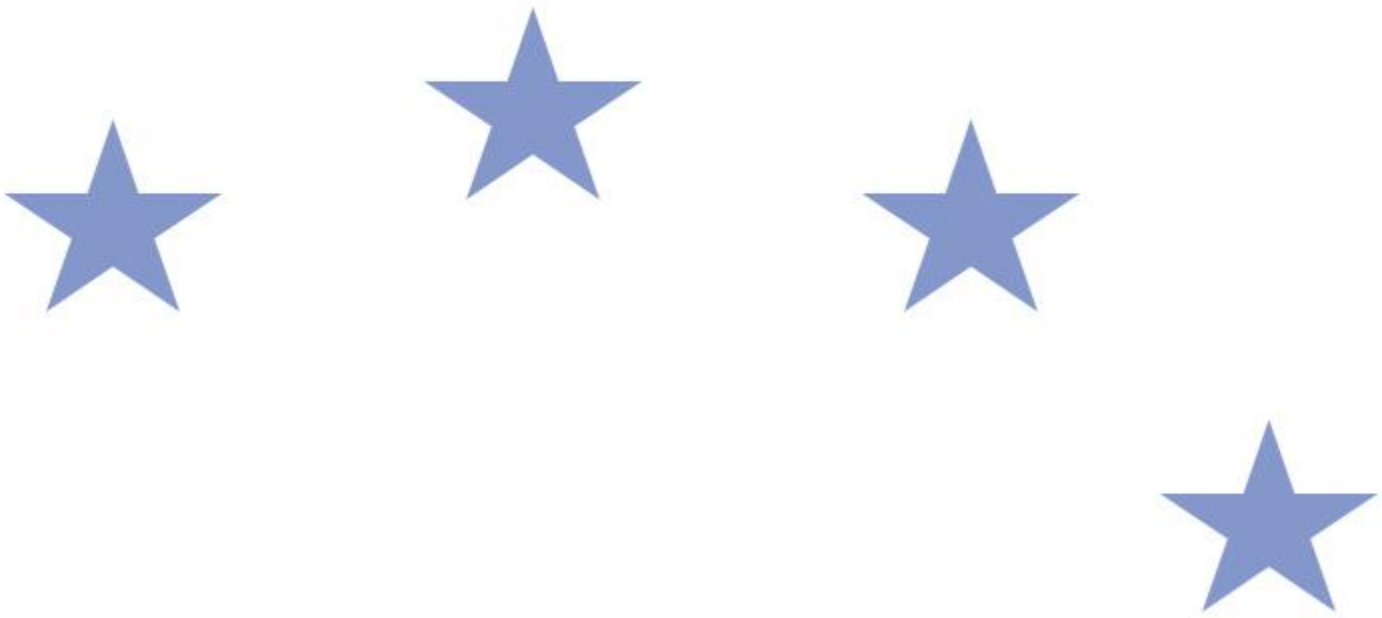

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Funds and single-name CDS: Hedging or Trading?♦

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Abstract

This paper offers a comprehensive overview of the drivers behind the use of single-name credit default swaps by UCITS investment funds, using EU regulatory data on derivatives. We look at the fund characteristics associated with the use of single- and multi-name CDS, and show that fixed-income funds and alternative funds are ten times more likely than other fund types to use CDS. Funds that belong to a large fund family are also 75% more likely to use CDS, especially as net sellers, which exposes them to significant credit risk and raises the spectre of potential moral hazard. We then match single-name CDS positions with the portfolio holdings of CDS users, and document that funds hold the underlying bond in half of the cases for sovereign CDS, and 30% of the time for corporate CDS. Looking in particular at buy-side positions, we find that only around 5% of single-name CDS positions match the market exposure from the bond. Overall, these results call into question claims that the primary purpose of single-name CDS usage by funds is hedging.

JEL Classifications: G01, G10, G20, G23

Keywords: Investment funds, credit default swaps, EMIR data.

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1. Introduction

The use of derivatives by European investment funds is of particular interest for several reasons. While the use of derivatives by banks is well documented, evidence relative to investment funds is much more limited at EU level but is key to address potential financial stability risks. As a result, the economic literature is increasingly looking into the role of non-banks in global financial markets, including in derivatives markets. In particular, the EU asset management industry has experienced very strong growth since 2009, with fund assets increasing on average more than 5% per year to reach around EUR 16tn in 2018[1] and growing evidence of their involvement in EU derivatives markets (Bias et al., 2019, Molestina Vivar et al., 2019, Braunsteffer et al., 2019).

Derivative instruments can be categorised according to their underlying asset class, i.e. equity, credit, interest rate, commodity and foreign exchange. In this article we focus specifically on credit default swaps (CDS), which account for the vast majority of the EU credit derivatives market (ESMA, 2018, 2019), for three reasons:

— CDS are mainly traded OTC, which is usually synonym of greater opacity and lower product standardisation;

— CDS played a major role in the global financial crisis by allowing the redistribution and amplification of credit risk without sufficient monitoring by regulatory authorities; and

— CDS are key financial instruments for bond funds, which have taken on extra risk in recent years in a prevailing low interest-rate environment (ECB, 2019).

CDS are instruments used to transfer the credit risk of a reference entity (corporate or sovereign) from one party to another. In a CDS, the protection seller agrees to make a payment to the protection buyer in case of a credit event on a prespecified reference entity. In exchange for this promised payment, the protection seller receives a periodic premium payment from the buyer. A credit event is a legally defined event that typically includes bankruptcy, failure-to-pay and restructuring.

One fundamental question that regularly resurfaces are the motives behind the use of CDS, and more specifically the extent to which CDS are used by funds for hedging, a recurrent claim made by the industry[2]. While other papers have already examined this question in the banking sector context[3], the CDS market has experienced profound transformations in the past decade (Aldasoro et al., 2018), while the composition of the EU financial system evolved, giving rise to new actors and risks. Concretely speaking, CDS have evolved from an arcane financial instrument to a mainstream tool used by a wide variety of financial-sector entities, such as collective investment vehicles. Although CDS are not the most-used type of derivative by fund managers[4] (see e.g. ESMA (2019) and Bias et al. (2019)) on the use of derivatives by equity funds), they represent nonetheless a useful instrument to implement credit-based strategies.

[1] With EUR 9,968 bn, UCITS account for 62.2% of total European investment fund assets at end Q318, with the remaining 37.8% (EUR 6,064 bn) managed by non-UCITS funds. See EFAMA https://www.efama.org/Publications/Statistics/Quarterly/Quarterly%20Statistical%20Reports/181204_Quarterly%20 Statistical%20Release%20Q3%202018.pdf

[2] See EFAMA (2012), or SIFMA AMG and ICI (2016).

[3] See for example Acharya et al. (2018) and Gunduz (2018).

[4] Using data from ESMA (2019), as at December 2018 UCITS' gross notional exposure from CDS represented 3% of their aggregate exposure from all derivatives and 2% of their derivative contracts. However, these figures combine derivative asset classes with different definitions of notional and different maturity structures.

This paper aims to provide the beginning of a response to the question of hedging versus trading, by investigating the drivers of CDS usage by EU UCITS funds[5] and the reasons motivating their use of single-name CDS. To do so, we first identify the key characteristics of funds making them more likely to use CDS. We then restrict the analysis to CDS users to single out the characteristics that are associated with larger CDS exposures. Lastly, we match fund portfolio holdings with their single-name CDS positions to understand whether these instruments are used for hedging.

There may be several reasons why funds use CDS. If a fund buys a CDS, it may be hedging a position by paying a yearly premium until a pre-defined credit event occurs or until the contract expires. This protection could also be part of a negative basis trade, through which the fund offsets totally or partially the credit risks from its long positions while earning the yield spread.[6] On the other hand, it may be a purely speculative buy betting on the fund's pessimistic view about the financial health of the reference entity. A fund may also choose to sell a CDS, in which case it receives the premium but bears the cost in case of credit event. When a fund sells CDS, it thereby gains credit exposure to the reference entity without holding the underlying bonds – that is, it creates a synthetic bond that delivers the yield on the bond that the CDS protects. Therefore, investment funds may get higher yields by selling CDS contracts on reference entities with high spreads without altering the perceived risk of the portfolio in the absence of major credit events. However, the incremental returns from selling CDS come at the cost of a hidden tail risk.

With this paper we complement the literature analysing institutional investors' CDS investments by providing empirical results for the European markets. For the US CDS markets Adam and Guettler (2011), focusing on the largest 100 US corporate bond funds, find that CDS are predominantly used to increase a fund's exposure to credit risk rather than to hedge credit risk.[7] Our conclusions for the European market are similar, and apply to a much larger number of fixed-income and alternative open-ended funds.

Our paper relies primarily on EU credit derivatives data reported to trade repositories (TRs) under the European Market Infrastructure (EMIR). As granular data on derivatives only became available relatively recently following the implementation of post-crisis reforms, the empirical literature that makes use of EMIR data is still relatively scarce.[8] Abad et al. (2016) provide a first snapshot of derivatives markets in the EU based on open transactions in the EMIR data as of 2 November 2015 that were reported to DTCC, the largest TR registered in the EU. The authors find that investment funds are not the main players in these markets, with less than 4% of the market in terms of gross notional. These results are in line with Clerc et al. (2014) who use network analysis to show how the potential "super spreaders" of financial contagion, identified as the most interconnected participants, consist mostly of banks. ESMA (2018) also offer a comprehensive description of EU derivatives markets by asset class, with total gross notional in credit derivatives outstanding of around EUR 13tn, including less than 10% from UCITS and alternative investment funds.

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5 The UCITS Directive (2014-91/EU) is a detailed, harmonised framework for investment funds that can be sold to institutional and retail investors throughout the EU. UCITS grants funds authorised in one Member State to be distributed in another Member State using a "passport".

6 A negative basis trade exploits an arbitrage opportunity created by a difference between the price of a bond and the price of a credit default swap (CDS) that hedges it. If the payment for the CDS is less than the spread on the bond, then this means that holding both generates a risk-free profit, provided that the maturities of the bond and the CDS match. See Oehmke and Zawadowski (2017).

7 Adam and Guettler (2011) also find that funds that use CDS underperform funds that do not use CDS and they explain this underperformance with poor market timing. However, we don't explore the relation of the use of derivatives with fund performance in this paper and we leave this important topic for future research.

8 The analysis is based on consolidated data from the six relevant EU Trade Repositories (TRs) in 2017.

The comparatively small share of funds in the EU credit derivatives may not provide an accurate representation of the risks though. D'Errico et al. (2016) investigate more closely the network structure of the EU CDS market, focusing on the flow of risk between the sectors of counterparties trading CDS on the major sovereign and financial reference entities from 2011 to 2014. They find that risks flow from a large number of entities buying protection on these reference entities, such as hedge funds, to a smaller number of entities, including other non-bank financial institutions, through a concentrated network of derivatives dealers. This highlights the relevance of EU funds as ultimate risk buyers and sellers. Moreover, in their analysis of the network structure of OTC markets, D'Errico and Roukny (2017) find that the size of OTC derivative markets can be reduced using portfolio compression, which is a multilateral netting process that replaces many trades with fewer trades to reduce the overall gross notional position while maintaining the same net risk profile. Focusing on UCITS funds, Braunsteffer et al. (2019) confirm that the CDS market is highly concentrated, with 13 large dealers acting as counterparty to the vast majority of CDS transactions that involve UCITS funds. The use of CDS by UCITS tends to be concentrated in large fixed-income and alternative funds (including hedge funds). Braunsteffer et al. (2019) further find that funds with directional strategies, such as fixed-income and allocation funds (i.e. mixed funds), are on aggregate net sellers of CDS. A large majority of CDS used by funds have an index as underlying, from which funds can gain exposure to multiple entities at once within one sector or region. Lastly, the authors document that most sovereign single-name CDS are written on emerging market issuers, highlighting the role that these instruments can play in facilitating access to less liquid markets.

Building on these results, our paper investigates the drivers of single-name CDS usage by UCITS investment funds. First, we look at the fund characteristics associated with the use of single- and multi-name CDS and find that fixed-income funds and alternative funds are ten times more likely than other fund types to use CDS. Moreover, funds that belong to a large fund family are 75% more likely to use CDS, especially as net sellers of CDS. This exposes them to significant credit risk and raises concerns of potential moral hazard. Second, we investigate the drivers of net CDS exposure size, and find fund size to be the main driver for both buy and sell-side exposures. Lastly, we match fund portfolio holdings with single-name CDS data, and find that i) only 30% of net CDS positions are covered, ii) less than 5% of net CDS positions on the buy side are used to hedge the market exposure from the underlying bond (within a 25% tolerance band). However, hedging positions tend to be significantly larger than other positions, in particular when covering a risky issuer, pointing to a limited role for single-name CDS in risk management.

The rest of the paper is organised as follows. Section 2 investigates the fund-level drivers of CDS usage by funds, section 3 focuses on net single-name CDS positions, and section 4 concludes.

2. Fund characteristics driving CDS usage

This section looks into the characteristics of funds that are associated with the use of CDS, as well as the drivers of net CDS exposure size.

2.1 Data description

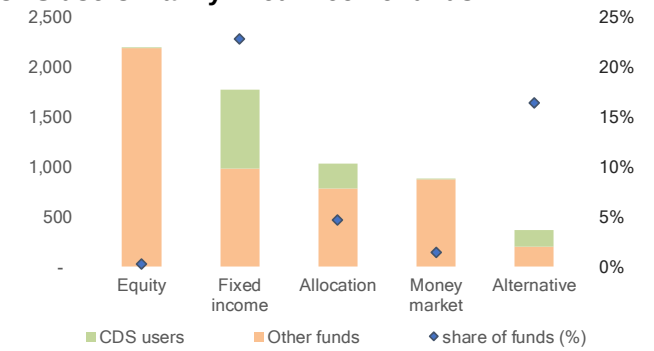
The analysis in this section relies on the following main sources of information:

- Transaction-level data on CDS reported to TRs under EMIR, which provides detailed information on counterparties, contract features and underlying;
- Investment fund characteristics (name, type and size) data from Morningstar and Refinitiv Lipper.

To investigate the extent to which EU funds rely on CDS, we start with a sample of more than 18,849 UCITS funds, with total net asset value (NAV) of EUR 6.4tn – i.e. more than three fourths of the UCITS fund industry NAV as at 2018. These funds belong to the following categories: allocation (or mixed), alternative, commodity, convertible, equity, fixed income, miscellaneous, property, and money market. In terms of net assets, most funds in our sample are equity (34%), fixed income (28%), and allocation funds (16%). The average net assets of a fund are EUR 346mn (Table A.1).

Replicating the methodology used in Braunsteffer et al. but using CDS market snapshots from two different points in time,[9] we find that 1,557 UCITS funds used CDS, i.e. around 8% of the original fund sample (19% in terms of net assets). These funds account for 4% of all outstanding CDS contracts in the EU, or 3% of total CDS market notional. They are on average much larger than UCITS not using CDS contracts, except for money market funds. The proportion of funds using CDS was highest for fixed income and alternative funds, with respectively 23% and 16% of funds belonging to these categories identified as counterparty to at least one trade (45% of net assets; Chart 1). For the subsequent analysis, funds using CDS are flagged as CDS users.

Chart 1
Net assets of UCITS funds
CDS users mainly fixed-income funds



Note: Net assets of UCITS funds split between CDS users and others by fund type, and share of CDS users in the number of funds.
Sources: Morningstar, TRs, ESMA.

[9] The dates are 24 February 2017 and 27 October 2017. By relying on two different types, we aim to capture "occasional" CDS users, i.e. funds that may not always have open interest on CDS markets.

2.2 Main hypotheses

To investigate the fund characteristics driving CDS usage, we rely on three sets of hypotheses. The first aims to confirm the results of Braunsteffer et al. (2019) who identify some key fund-level characteristics that are typically associated with CDS usage by EU funds. Namely, we test whether larger funds are more likely to use CDS, and whether CDS usage is concentrated in fixed-income and hedge funds.

The second and third sets of hypotheses, set out in the following subsection, test the concept of fund families, and the strategies usually associated with CDS usage. The objective of the second set of hypotheses is to understand whether funds that belong to large fund "families" or fund houses are more likely to use CDS. There are different reasons that explain why funds that belong to a large family may be more likely than others to use CDS. For example, a fund manager that belongs to a large banking group is likely to have easier and cheaper access to CDS markets through the bank's derivative dealing business. The array of investment vehicles proposed by large banks and insurance companies to their clients (in particular professional investors) is also likely to include funds that carry out complex strategies, which often involve the use of derivatives.[10]

In the US Jiang and Zhu (2015) find that CDS usage is concentrated in the largest fund families. We rely on a similar methodology to organise our data as families containing funds owned by the same consolidated entity, based on public information.[11] After consolidation, we define two main groups of investment fund families based on the following thresholds:

— Tier-1 families with combined net assets in excess of EUR 100bn;

— Tier-2 families with combined net assets between EUR 50bn and EUR 100bn.

The Tier-1 group includes 15 fund families, spanning 3,854 funds, with a combined NAV of EUR 2,377bn. Almost all of the consolidated entities within this top 15 are either a large banking or insurance group. Based on the above reasoning, we expect the probability of using CDS to increase the most for funds that belong to a Tier-1 family. The Tier-2 group includes the next 21 largest fund families, which are of a more diversified nature (i.e. not exclusively owned by a large bank or insurance group) and include 2,360 funds with for a combined NAV of EUR 1,464bn. We also expect funds that belong to a Tier-2 family to be more likely to use CDS than independent funds, but less so than Tier-1 family funds. We use Tier-1 and Tier-2 dummy variables to proxy the size of the consolidated entity that owns funds within our sample and test these hypotheses.

Finally, the third set of hypothesis claims that some specific fund objectives and strategies can lead funds to rely more systematically on CDS. First, we propose that objectives that require funds to invest in less liquid securities rely more frequently on CDS. This builds on the argument of Oehmke and Zawadowski (2017) that CDS markets serve a standardisation role for fragmented and less liquid bonds. The candidates to test this hypothesis include mainly fixed-income funds that invest in emerging markets, and corporate bond funds (especially high-yield). Second, we postulate that funds implementing hedge-fund strategies tend to rely heavily on CDS. These strategies include mainly: total return, macro, market neutral, long/short, and absolute return funds. CDS are usually the main financial instrument used to hedge credit risk, making it an essential risk-management tool for funds that aim to remain market neutral or

[10] This hypothesis has been investigated in the literature by Koski and Pontiff (1999) who survey equity mutual funds and find that the use of derivatives is positively correlated with membership in a fund family.

[11] Given the absence of comprehensive fund management company ownership information, this consolidation exercise was carried out manually. Considering frequent changes in fund ownership, we used October 2017 (i.e. our CDS market snapshot date) as cut-off date, ignoring all operations that have taken place subsequently.

carefully calibrate their risk exposure. Funds relying on alternative strategies may also rely on CDS to obtain credit exposure, as in Adam and Guettler (2011).

2.3 Probability that a fund uses CDS

To test these hypotheses, we use the following logit model:

$$\Pr(Use\ of\ CDS_i = 1) = \alpha + \beta(fund) + \gamma(family) + \mu(strategy) + \varepsilon_i$$

where the dependent variable is equal to 1 if the fund is a CDS user (i.e. a fund that was counterparty to at least one CDS transaction), 0 otherwise. Within explanatory variables, *fund* includes:

- Size: measured by fund NAV. We rely on log values, in line with the standard practice in financial economics;
- Fixed income: dummy variable equal to 1 if the fund type is fixed income and 0 otherwise;
- Alternative: dummy variable equal to 1 if the fund type is alternative and 0 otherwise;

family includes:

- Tier-1 (Tier-2) group: dummy variable equal to 1 if the fund belongs to a Tier-1 (Tier-2) family;

strategy includes:

- FI*emerging: dummy variable interaction between Fixed Income (FI) and a dummy variable equal to 1 if the fund invests in emerging markets;[12]
- FI*corporate (FI*HY, FI*totalreturn): dummy variable interaction between FI and dummy variables equal to 1 if the fund name includes “corporate” (“high yield”, “total return”); [13]
- Alt*macro (Alt*absolute): dummy variable interaction between Alternative (Alt) and a dummy variable equal to 1 if fund name includes “macro” (“absolute”).

Our hypotheses are confirmed if we find a statistically significant and positive coefficient for the variables, indicating a higher probability that a fund uses CDS. The results of the regression are presented in Table 1 below, as odds ratio across three specifications.[14] All results are statistically significant at the 1% level.

[12] Out of the 1,744 funds that invest in emerging markets, more than 1,000 are equity funds. Braunsteffer et al. (2019) show that equity funds typically do not use CDS, therefore we interact the emerging variable with the fixed-income variable to assess the likelihood for the 567 fixed-income funds in our sample.

[13] While the interaction of corporate and HY with FI (and of macro and absolute with Alt) is redundant, it allows us to focus on the specific effect of a specific strategy within the fixed-income fund (and alternative) category where most CDS users are found. This also ensures that miscategorised funds are excluded from the estimation.

[14] For presentation purposes, the table only includes strategies that yielded statistically significant results. Other strategies tested include: conservative, short duration, and long duration for fixed-income funds; alpha, hedge, market neutral, and long/short for alternative funds.

Table 1
Logit regression results
Odds of CDS usage

	(1)	(2)	(3)
Fund size and type			
Size	1.51	1.39	1.39
Fixed income	10.55	11.22	9.49
Alternative	9.44	11.42	10.16
Fund families			
Tier-1 family	-	3.39	3.46
Tier-2 family	-	2.87	2.86
Fund objectives and strategies			
FI*emerging	-	-	1.56
FI*corporate	-	-	1.58
FI*HY	-	-	1.68
FI*totalreturn	-	-	4.04
Alt*macro	-	-	4.14
Alt*absolute	-	-	1.76
Constant	0.00	0.00	0.00
Observations	18,448	18,448	18,448

Note: Odds ratio from a logit regression, testing the impact of three sets of hypotheses on the probability that a fund is a CDS user. All results statistically significant at the 1% level. FI=fixed income; Alt=alternative; HY=high yield. See tables A.1 and A.2 in Annex for descriptives.
Sources: ESMA.

The results confirm our three sets of hypotheses. Regarding fund characteristics, larger funds have a higher propensity to use CDS, as indicated by the positive and statistically significant coefficient of the *Size* variable. However, the highest impact on the probability of using CDS is fund type, with fixed-income and alternative funds ten times more likely than other fund types to use CDS.

Regarding families, there are higher odds that funds that are part of a Tier-1 group use CDS, as expected. The effect is somewhat weaker for Tier-2 families. This is in line with Adam and Guettler (2011) who find that US fixed income funds belonging to a large fund family are 30% more likely to use CDS. For the European fund market, we find the corresponding figure to be 75%, highlighting the more systematic use of CDS within large fund houses.[15] The "family effect" also appears to take some of the *Size* effect away, likely reflecting that the largest investment funds are usually part of a large fund family.

The results also confirm our hypotheses regarding the relevance of CDS for fixed-income funds investing in less liquid securities – in particular high-yield bond funds – and for the two following alternative fund strategies: macro and absolute. Other alternative fund strategies (alpha, market neutral, long/short) were not found to have a statistically significant impact, and therefore are not reported in Table 1.

[15] This probability is marginally higher when considering all fund types (i.e. not just fixed-income funds). The difference with US funds may be due to sample size, with 4,355 fixed-income funds covered in our paper compared with 100 in Adam and Guettler (2011).

2.4 Risks in net sell CDS exposure

We now turn to the 1,359 funds that were using CDS on 27 October 2017 in order to investigate their net exposures as of this date. Most of the funds in the sample are fixed income (65%), followed by alternative (16%) and allocation funds (16%).

Like other CDS market participants, funds may be either on the buy side or on the sell side of a trade. On the buy side, the fund is liable for the regular payment of a premium, against which it will receive a sum equal to the CDS notional in case of credit event (usually a default of the underlying reference entity). On the sell side, the fund receives the CDS premium, implying that it may choose to sell CDS to boost its returns, but needs to compensate the buyer if a credit event occurs.[16]

Sell-side positions should be a particular source of concern for authorities. Following a credit event, the large one-off payments required to compensate CDS buyers may force funds to fire-sell assets in order to free up cash and meet their obligations. Moreover, such contingent liabilities are not captured on funds' balance sheet nor in conventional measures of financial leverage, leaving investors in the dark as to the potential vulnerability of the funds they are investing in.

We split our sample between funds holding net buy CDS exposure and those holding net sell CDS exposure, by calculating for each fund the difference between the sum of its buy CDS and sell CDS positions, regardless of the type of underlying:[17]

$$Net\ CDS\ exposure_i = \sum_i Buy\ CDS_i - \sum_i Sell\ CDS_i$$

While this is not indicative of the credit risk exposure of a fund to a particular issuer or sector, it allows us to focus on risks from sell-side exposure and identify fund characteristics that increase the likelihood of such behaviour.

Out of the 1,359 funds, we find that 635 funds have net sell CDS exposure (a negative net CDS exposure), i.e. 47% of CDS users. We rely on the same model specification and regression type to determine the effect of fund characteristics on the likelihood of being a net seller of CDS. Table 2 below shows the results of the three regressions.

[16] While we tested in the next regression for the existence of a relationship between the odds of being a net seller and fund returns, the results were not significant. Given that the focus of our paper is on risk related to the use of CDS, this variable was not included in the final specification. We leave the question related to the relation between fund returns and the use of CDS to future research.

[17] There are different methodologies to calculate net positions. We start with the simplest approach to investigate which fund-level characteristics play a role in a fund's CDS exposure side once all positions are aggregated. Other methodologies such as "bilateral netting" (see section 3) are more accurate in assessing exposure to individual entities, but also require the use of more granular information, which usually implies working on a smaller segment of the market due to limitations in the availability of information and data completeness.

Table 2
Logit regression results
Odds of net sell CDS exposures

	(1)	(2)	(3)
Fund size and type			
Size	0.97	0.96	0.96
Fixed income	0.59***	0.62***	0.58***
Alternative	0.33***	0.36***	0.38***
Fund families			
Tier-1 family	-	1.43***	1.41***
Tier-2 family	-	1.90***	1.86***
Fund objectives and strategies			
FI*emerging	-	-	0.86
FI*corporate	-	-	1.27
FI*HY	-	-	1.73**
FI*totalreturn	-	-	1.27
Alt*macro	-	-	1.06
Alt*absolute	-	-	0.69
Constant	2.46	2.43	2.57
Observations	1,346	1,346	1,346

Note: Odds ratio from a logit regression, testing the impact of three sets of hypotheses on the probability that a CDS user has net buy exposure or net sell exposure. FI=fixed income; Alt=alternative; HY=high yield. 13 funds were found to have 0 net exposure and were excluded from the regression. ***p<0.01, **p<0.05, *p<0.1. See table A.3 in Annex for descriptives.
Sources: ESMA.

Unlike the likelihood of using CDS, fund size does not appear to be a key determinant of the exposure side. This means that small and large funds have equal chances of buying net buyers or net sellers of CDS. Moreover, the average size of funds with net buy side exposure (EUR 896 million) is close to that of funds with net sell side exposure (EUR 822 million).

In contrast, fund type appears to be a statistically significant driver: fixed-income funds are 37% more likely than other fund types to hold net sell CDS exposure. Such funds are also 10% larger on average than the rest of the sample (EUR 928 million). For alternative funds, the equivalent probability is 28%, for an average fund size of EUR 1.1bn.

Belonging to a large family of funds increases by around 60% the likelihood of having net sell side exposure. This raises questions about the possible existence of moral hazard, which may lead funds that benefit from the explicit or implicit guarantee of a large group to take on significantly more risk, compared with smaller fund houses or independent asset managers. For banking groups that have sizeable unconsolidated asset-management activities, this raises the prospect of step-in risk, whereby entities have incentives beyond contractual obligations or equity ties to step in, in order to support unconsolidated entities in financial distress (BCBS, 2017).

The fund strategies tested do not appear to materially affect the probability of holding net sell CDS exposure, with the exception of high-yield funds. The role of CDS as a tool to obtain long synthetic exposure to an issuer appears thus only validated in the context of high-yield bonds.

2.5 Drivers of net CDS exposure size

We then turn our attention to the drivers of funds' net CDS exposure size. The high dispersion of net exposures in our sample suggests that the impact of the determinants may not be constant across the distribution but may instead vary. The average net buy position is

EUR 109 million, while the average net sell position is EUR 220 million which is driven primarily by much larger positions at the top of the distribution.

To assess this differentiated impact, we run quantile regressions of funds' net CDS exposures (in million euros) on a similar set of explanatory variables, now focusing on fund size, type and family (intuitively, strategies are not expected to matter when it comes to exposure size). The results are reported separately in Table 3 for net buy CDS exposures and Table 4 for net sell CDS exposure across three quantiles (25th, 50th and 75th).

Table 3
Quantile regression results
Drivers of UCITS net buy CDS exposures

	Q25	Q50	Q75
Size	5.03***	15.55***	34.80***
Fixed income	-0.37	1.77	26.05***
Alternative	6.84**	33.41***	118.10***
Top family	-2.09	8.21	-10.58
Mid family	-3.00*	-6.05*	-32.66***
Observations	689		

Note: Quantile regressions of net buy CDS exposures using robust standard errors. ***p<0.01, **p<0.05, *p<0.1.
Sources: ESMA.

Table 4
Quantile regression results
Drivers of UCITS net sell CDS exposures

	Q25	Q50	Q75
Size	2.51***	9.11***	29.74***
Fixed income	0.85	5.98	44.83***
Alternative	5.81	17.95***	66.99***
Top family	0.31	-0.22	24.52*
Mid family	1.82	12.46**	78.65**
Observations	689		

Note: Quantile regressions of net sell CDS exposures using robust standard errors. ***p<0.01, **p<0.05, *p<0.1.
Sources: ESMA.

The estimates from the quantile regressions show that fund size is the most consistently statistically significant variable when it comes to exposure size, for both net buy and net sell exposures. The impact of fund size increases logically with the exposure size, as shown by the growing value of the coefficients. Within the top quantile, a 1% increase in fund size would lead to a EUR 300,000 increase in its net CDS exposure size.

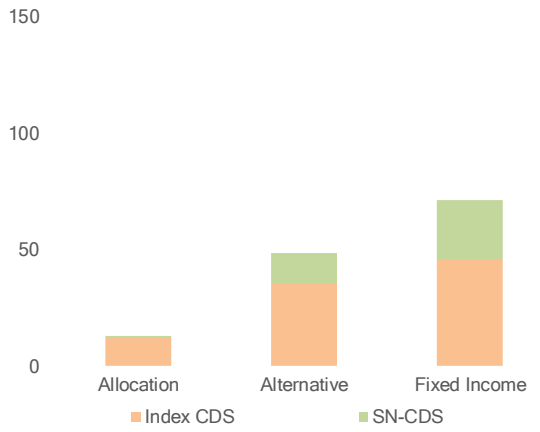
The fixed-income and alternative variables are consistently significant in the top quartile, reflecting the fact that these types of funds hold the largest positions. The effect is particularly strong on the buy side for funds following alternative strategies, which are associated with a EUR 1.2 million increase in net buy exposure. Overall, the results show that alternative funds tend to have larger positions both on the buy side and the sell side.

Regarding the largest fund families, the results are not robust and overall statistically weak, signalling that family is not a key determinant of position size. This may also be due to some weak correlation between the top family and fund size variables (14%). On the other hand, the coefficients are statistically significant for Tier-2 families, with much larger net sell CDS exposure for funds part of a family, reinforcing the suspicion of moral hazard.

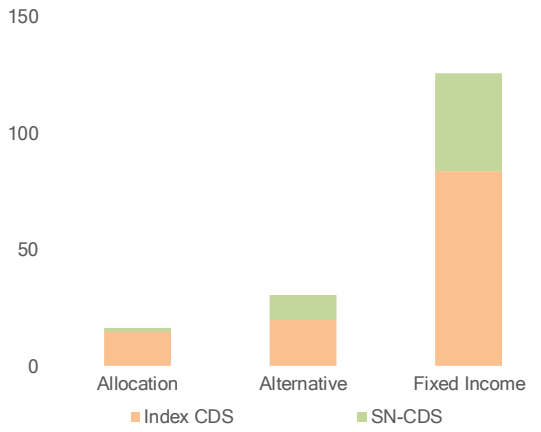
3. Single-name CDS: Hedging or trading?

EMIR defines three main types of CDS underlying: single-name, index, and basket. In October 2017, multiname CDS (index or basket) accounted for 70% of UCITS funds' gross CDS notional, i.e. EUR 212bn. Single-name CDS amounted to a gross CDS notional amount of EUR 96bn, including (EUR 68bn for fixed-income funds) with 59% on the sell side (Charts 2 and 3).

Charts 2 and 3
Gross CDS notional by underlying type and fund type, buy-side (left) and sell-side (right)
Sell-side index CDS positions much larger for fixed-income funds



Note: Sum of gross notional buy-side positions held by UCITS funds in index and single-name CDS. EUR bn.
Sources: TRs, ESMA.



Note: Sum of gross notional sell-side positions held by UCITS funds in index and single-name CDS. EUR bn.
Sources: TRs, ESMA.

3.1 Single-name CDS: risk management or risk taking?

A fundamental question that remains largely unanswered is whether CDS are used for speculative or hedging purposes. We aim to provide the beginning of an answer for investment funds by matching single-name CDS positions with bond portfolio holdings from a sample of more than 500 UCITS funds.

There may be several reasons why funds choose to use CDS. A fund can buy a CDS to hedge another position, either from its securities holdings or from other derivatives. The hedge is considered "perfect" when the CDS covers the entire credit risk arising from the position. However, CDS can also be used for other forms of protection, the most common one being "proxy hedging". In a proxy hedge, a sovereign CDS contract is used to obtain protection against risks from non-sovereign assets that are correlated, such as corporate bonds or shares (IMF, 2013).

A variety of alternative uses also exist, such as obtaining protection from a single-name CDS against adverse developments that might negatively impact a particular reference entity within a CDS index[18]. Buy CDS positions may also be part of a negative basis trade, through which funds offset risk from a long position in a bond while earning the difference between the CDS and bond spreads. According to Jiang and Zhu (2016), such trades are most profitable for investors with long-term horizons on bonds that are illiquid. Finally, CDS may be bought exclusively for speculative purposes, either to bet on a positive valuation effect (an increase in

[18] Our data do not permit the identification of the index underlying. However, future research on the topic will be possible as the revised EMIR implementing technical standards (applicable since 1 November 2017) allow the identification of the underlying for the CDS on indices. See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0105&from=EN

the CDS spread), which usually reflects a deterioration in the perceived risk of the reference entity, or in extreme cases to bet on the default of the reference entity.

Funds may alternatively choose to *sell* CDS, in which case they cash the premium and may benefit from negative valuation effects, but also exposes them to potential losses in case of a credit event. Therefore, when a fund sells CDS, it obtains exposure to the reference entity without holding the underlying bonds – that is, it creates a synthetic bond that delivers a yield-equivalent (the CDS premium). Since CDS transactions are off-balance sheet, a fund may in theory sell protection on risky issuers to receive hefty premium payments without seeing its average portfolio quality being affected, but this comes at the cost of hidden tail risk. Focusing on US fixed income funds, Adam and Guettler (2011) show that funds are mainly net sellers of CDS to increase their risk exposure. They also find that underperforming funds tend to increase their short CDS exposure to compensate but tend to do so before credit risk premia fall – causing them losses.

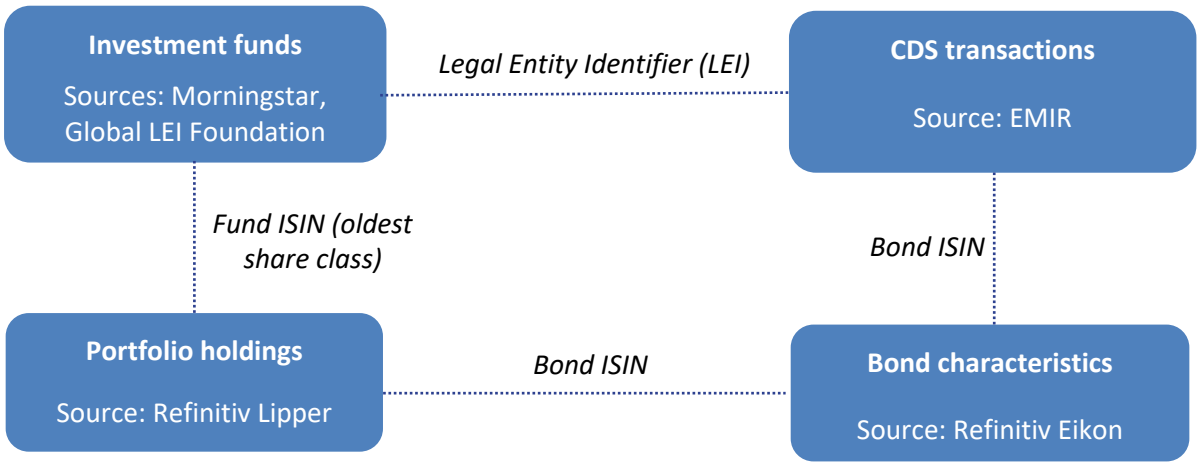
One alternative reason concerns the use of CDS for liquidity reasons, with CDS markets considered generally much more liquid than corporate bond markets. In line with this, Oehmke and Zawadowski (2017) suggest that funds may have an important liquidity incentive to choose CDS over the bonds issued by the reference entities in order to obtain roughly equivalent credit exposure. Liquidity in corporate bonds has been traditionally limited by both the fragmentation of multiple issues and the fact that many investors tend to hold the bonds until maturity (see De Renzis et al., 2018, for an analysis of liquidity in EU fixed income markets). In contrast, the liquidity of the CDS market benefits from standardisation as well as active trading (Loon and Zhong, 2014, and Aldasoro and Ehlers, 2018). Hence, investors with higher utility for liquidity-driven trades may have a preference for sell CDS positions in the relatively more liquid CDS market over long positions in the relatively less liquid underlying bond market.

Building on these reasons, this last section aims to shed light on the motives behind single-name CDS exposures by EU UCITS funds.

3.2 Data

In this section, we rely on the ISIN of the securities used as underlying in SN-CDS (SN-CDS) to investigate the bond-level drivers of the net CDS positions held by UCITS funds (Chart 4). In addition, we use ESMA's proprietary database on credit ratings to obtain the CDS underlying bond rating, and to measure the average quality of each fund's portfolio. The latter is a proxy for risk appetite, which is expected to play a role in the size of SN-CDS positions. The average and median quality of fund portfolio holdings and of CDS underlying issuers are remarkably similar (BBB), suggesting that the quality of CDS positions is broadly in line with the risk profile of each fund (Table A.4). Finally, we enrich the dataset with information on the CDS reference entities (i.e. the issuer of the security) from Refinitiv Eikon.

Chart 4
Database construction
Multiple data sources



Compared with the previous section, SN-CDS allow for netting methodologies that provide a much more accurate picture of next exposures. Guagliano and Mazzacurati (2018) provide an overview of the buy and sell-side exposures of UCITS funds from SN-CDS by issuer type (sovereign, financial and non-financial), using a multilateral netting methodology. To assess the bond-level drivers of net SN-CDS exposures, we calculate for each fund the difference between its buy and sell positions in a single issuer across counterparties. This bilateral netting procedure offers a more accurate representation of funds' net CDS exposures to specific issuers from CDS.[19] [20]

$$Net\ SNCDS\ position_{ij}^{Bilateral} = \sum_{k \in j} Buy\ SNCDS_{i,k} - \sum_{k \in j} Sell\ SNCDS_{i,k}$$

3.3 Descriptive analysis

We focus on the 381 fixed-income and alternative funds that hold at least one single-name CDS position, and for which portfolio composition is available, covering more than 4,000 SN-CDS positions split almost evenly between buy and sell side. Fixed-income funds hold around 3,000 positions amounting to a notional amount of EUR 21bn. Slightly more than half of their exposure is on the buy side (EUR 11.2bn), with average buy-side position size of EUR 8.4mn (EUR 6.1mn for sell-side positions). Alternative funds hold more than 1,000 SN-CDS positions, for a notional amount of EUR 6bn. Two thirds of their positions are on the buy-side with a combined exposure of EUR 4bn (Table 6).

Table 6
Descriptive statistics
Net single-name CDS exposures of funds (EUR mn)

	Buy CDS			Sell CDS		
	Net notional	Number of positions	Average position size	Net notional	Number of positions	Average position size
Fixed Income	11,249	1,341	8.4	9,910	1,631	6.1
Alternative	3,965	708	5.6	1,936	383	5.1

Note: Net single-name CDS exposures of UCITS funds in the sample, in EUR mn, and number of positions. Excludes net "0" positions.
Source: TRs, ESMA.

[19] There can be multiple ISINs associated with a single issuer. However, netting positions based on issuer name rather than ISIN only yields a marginal reduction in notional exposure, suggesting that SN-CDS trading tends to be concentrated on specific bond issuances.

[20] This is notwithstanding any hedging of exposure that might arise from offsetting positions in multi-name CDS.

In terms of single-name CDS user size, there are no significant differences between fixed-income and alternative funds, with an average NAV of around EUR 1bn. Most CDS positions are on corporate issuers, with only a minority of funds investing in both corporate and sovereign CDS (Table 7).

Table 7
Descriptive statistics
Corporate and sovereign single-name CDS positions

	Corporate CDS		Sovereign CDS		
	Number of positions	**Number of funds**	**Number of positions**	**Number of funds**	**Number of Funds w/ both positions**
Fixed Income	2,477	238	495	172	78
Alternative	1,011	43	80	24	18

Note : Number of positions and funds holding CDS positions, by fund type. Excludes net "0" positions.
Source: TRs, ESMA.

3.4 Covered and naked positions

We then document CDS positions that are covered or uncovered (i.e. naked) by matching the SN-CDS reference entities of fund *i* with the issuer of the bonds in fund *i*'s portfolio.[21] The results are described in Table A.5 in Annex.

Overall, less than 30% of funds' CDS positions are covered, i.e. there are around 2,900 CDS positions where the fund does not hold a bond from the corresponding issuer. Fixed-income fund CDS positions are more frequently covered (32%) than alternative fund positions (21%). For both fund types, the share of buy CDS positions that is covered is smaller (24% combined) than the share of covered sell CDS positions (34%). The divergence between fixed income and alternative funds is larger in notional terms: around 42% of CDS exposure in fixed-income funds is covered, versus 25% for alternative funds.

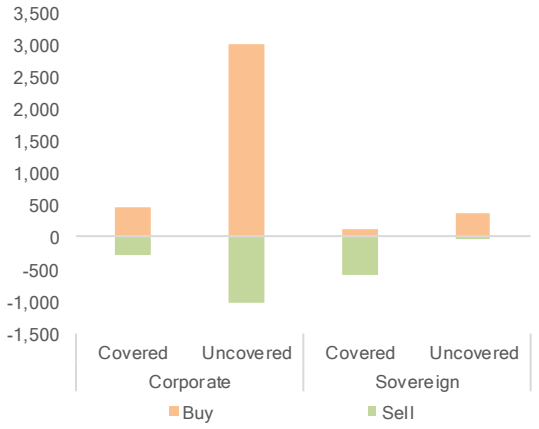
The drivers of buying and selling corporate CDS may differ from those in the sovereign CDS market. The latter tends to be more liquid and may for example serve to hedge against a correlated credit exposure in a corporate bond issuer for which no CDS is available (IMF, 2013). For this reason, we split corporate and sovereign CDS in two different subsets. Both fund types hold more positions and larger notional amounts in corporate CDS. The most striking feature is perhaps the low share of corporate CDS notional covered, especially for alternative funds on the buy side (Charts 5 and 6). This might reflect to an extent the unavailability of CDS contracts on some bond issuers, leading funds to purchase CDS on similar, correlated reference entities (e.g. firms operating in the same sector and country).

[21] We discarded a more granular approach based on matching bond ISINs. ISINs generally differ across maturities, listings and other bond-specific features – even when they are issued by the same entity. Therefore, a fund that wants to cover a long position in a bond can get a reasonable hedge by buying a single-name CDS on the same issuer, even though the underlying bond has a different ISIN. This may happen for example due to a limited range of contract options available in CDS markets, or to liquidity being concentrated on different maturities in CDS compared with bond markets.

Charts 5 and 6
Net CDS exposure of fixed-income (left) and alternative (right) UCITS funds

Large uncovered exposure in corporate CDS for alternative funds

Note: Net buy and sell CDS notional of fixed-income funds, EUR mn.
Sources: TRs, ESMA.



Note: Net buy and sell CDS notional of alternative funds, EUR mn.
Sources: TRs, ESMA.

3.5 Hedging or trading?

As previously discussed, funds that are net sellers of CDS take on significant (hidden) risk. Net sell CDS positions are *always* for speculative purposes, except where single-name CDS are used to offset exposure to a specific reference from a CDS index.

The picture is more complex for net buyers of CDS since these may be used either for hedging, trading, or a combination of the two. To investigate the relevance of hedging strategies, we calculate for each fund *i* and exposure to CDS reference entity *j* a "coverage ratio", defined as the ratio between the sum of net CDS positions of fund *i* on entity *j* and the market exposure of this fund to bonds issued by entity *j*:

$$Coverage\ Ratio_{ij} = \frac{\sum_j CDS\ exposure_{ij}}{\sum_j Market\ value_{ij}}$$

The coverage ratio of fixed-income funds tends to be higher than that of alternative funds (Table A.6). However, the picture is somewhat distorted by the large number of uncovered positions held by alternative funds. Overall, more than 75% of net buy CDS positions are uncovered, pointing to significant risk-taking behaviour also on the buy side. Covered CDS position are on average twice as large as the corresponding exposure to the underlying bond issuer but this is driven by a few large observations, as reflected in lower median values.

We use this coverage ratio to flag CDS positions that qualify as "pure hedges", which we define as the ratio being within the 0.75-1.25 range (to cater for potential deviations in exchange rates or reporting date from the various data sources). Out of 378 net buy-side sovereign CDS positions, 22 qualify as pure hedges (6% of the total). For corporate CDS, only 65 of the 1,671 buy-side positions do (i.e. 4% of the total).

CDS positions outside this range may also be used as imperfect hedges. Positions with lower coverage ratios (30% of sovereign CDS and 10% of corporate CDS) can serve to partially hedge a bond exposure. Positions with higher coverage ratios (14% of sovereign CDS and 10% of corporate CDS) may be used to offset exposure to a single issuer obtained from multi-name CDS, or from bond futures, in addition to hedging bond exposure. However, these "over-

hedging" positions can also be used to create a synthetic short position on the reference entity for trading purposes, or be part of complex strategies combinining hedging and trading, which may again involve some CDS index exposure.

We rely on the following model for the last set of regressions:

$$NetCDS_{ij} = \alpha + \beta(fund_i) + \gamma(risk\ profile_i) + \delta(hedging_{ij}) + \tau(proxy\ hedging_{ij}) + \theta(rating_j) + \partial(CDS\ index\ user_i) + \mu(hedging * rating) + \omega(CDS\ index\ user * overhedging) + \varepsilon_{ij}$$

Where $NetCDS_{ij}$ is the net CDS position of fund *i* on reference entity *j* (in absolute terms).

We use the same fund-level variables as in the previous sections, except for fund category (a large majority of the buy-side sovereign positions are held by fixed-income funds). We complement these with a $risk\ profile$ variable computed as the inverse of average portfolio rating, a lower portfolio quality being synonym of higher risk profile.

Regarding variables related to the CDS position side, $rating$ is the credit rating of the CDS reference entity averaged across the largest three credit rating agencies.[22] $Hedging$ is a dummy variable based on the procedure described above, which we then interact with $rating$ to assess the influence of bond issuer riskiness on hedging behaviour. $proxy\ hedging$ is introduced for sovereign CDS to test whether uncovered CDS positions are used to proxy-hedge a corporate bond holding from an issuer domiciled in the same country. Finally, $CDS\ index\ user$ is a dummy variable equal to 1 when a fund has CDS index exposure, interacted with an $overhedging$ variable for positions with a coverage ratio greater than 1.25.

The estimated coefficients of the fund-level variables confirm the findings of the previous sections (Table 8). Large funds tend to have larger net exposures. Funds that belong to one of the largest fund families tend to have smaller buy-side CDS position, mirroring the fact that they are more likely to hold net sell CDS exposures. The new finding here is that a higher risk profile is associated with larger exposure, leading us to the next part of the results on the reasons driving funds to buy CDS.

These results point to a role for hedging in the case of sovereign CDS. Buying a sovereign SN-CDS for "pure hedging" purposes increases a fund's net sovereign CDS position size by EUR 2.2mn. Moreover, proxy hedging has a small but statistically significant effect. In contrast, hedging through corporate CDS appears to play a much lesser role.

For the underlying bond issuer rating, higher credit quality is synonym of a larger CDS position, although the effect is relatively small. More importantly, the interaction of the hedging and CDS rating variables yields a statistically negative coefficient, highlighting that hedges tend to be smaller when covering a high-quality bond issuer. Taken together, these observations point to a dual role for sovereign CDS: facilitating access to less liquid market, while offering protection on riskier issuers. In this context, it should be noted that around half of the sovereign CDS positions held by fixed-income funds are on emerging markets.

Lastly, the results confirm that SN-CDS positions tend to be used in combination with CDS indices. The negative coefficient suggests that SN-CDS and CDS indices are used as substitutes, although the economic effect is relatively small. On the other hand, when combined

[22] For the *risk profile* and *rating* variables, the credit ratings are converted into a numerical scale ranging from 1 (the lowest rating) to 21 (the highest) and subsequently averaged.

with “over-hedging” positions, the positive coefficients appear to confirm that SN-CDS and indices are used as complements, especially when it comes to sovereign SN-CDS, although it is unclear whether this is primarily for hedging or trading purposes.

Table 8

OLS regression results

Net buy single-name CDS positions

	Sovereign	Corporate
Top family	-0.689***	-1.152***
	(0.187)	(0.088)
Fund size	0.554***	0.486***
	(0.062)	(0.022)
Risk profile	0.067*	0.036**
	(0.041)	(0.017)
Hedging	2.321***	0.721*
	(0.639)	(0.403)
Proxy-hedging	0.439**	-
	(0.183)	
CDS entity rating	0.094***	0.060***
	(0.022)	(0.011)
Hedging * CDS rating	-0.098**	-0.069**
	(0.043)	(0.030)
CDS index user	-0.463**	-0.460***
	(0.281)	(0.075)
CDS index user * Overhedging	1.590***	0.494***
	(0.281)	(0.101)
Constant	3.917***	5.072***
	(1.209)	(0.498)
Observations	378	1,627
R-squared	0.322	0.310

Note: OLS regression using robust standard errors. ***p<0.01, **p<0.05, *p<0.1. The dummy variables for fund categories (fixed income and alternative) are excluded due to the large predominance of fixed-income funds in the buy-side sovereign CDS sample. See tables A.5 and A.6 in Annex for descriptives.

Sources: ESMA.

4. Conclusion

Regulatory data on derivatives reported under EMIR allow authorities to improve their monitoring of risk in these markets. This article investigates the drivers of CDS usage by investment funds, building on previous findings by Braunsteffer et al (2019). We find that the probability that a fund uses CDS increases significantly for fixed-income and alternative funds, and to a lesser extent for funds that are part of large fund families. The analysis also investigates the influence of some specific fund features and underlying bond characteristics on net buy and sell CDS exposures. The main conclusion of this part is that fund size is a key driver of large net CDS positions.

Our paper also sheds some light on the tail-risk associated with funds' net sell CDS positions. Unlike buy exposures, which can be used to hedge a long position in the underlying bond, sell exposures are mainly used to gain credit exposure to a reference entity whose bonds are not available in the market, possibly due to market frictions (e.g. illiquidity). However, by allowing them to build up off-balance sheet leverage, net sell positions also expose investment funds to significant contingent risk, in case of default of the underlying reference entity. When the unhedged credit exposures are particularly large, this may stress the funds' balance sheet and lead to broader financial stability issues. On the other hand, this could be seen as a positive development since it shows that banks are buying protection on (at least some of) their assets. This imples that some of the credit risk in the banking sector is being transferred to the investment fund sector, reducing the risk of future taxpayer bailouts.[23]

Next, we match fund portfolio holdings with single-name CDS data and document that only half of sovereign CDS positions and 30% of corporate CDS positions are covered; in other words, more than two thirds of all CDS positions held by funds are "naked", i.e. without ownership of the underlying bond, including on the buy side. In particular, alternative funds hold a significant amount of uncovered corporate CDS, both in terms of number of positions and CDS notional. While this may be interpreted as evidence of speculative behaviour, there may be alternative reasons for this. For example, CDS on bond issuers may not be systematically available in the market, which may lead funds to purchase CDS contracts on similar reference entities.

Lastly, we focus on covered CDS and compute a coverage ratio for net CDS positions on the buy side. We find that only 5% of CDS match the exact market exposure from bond holdings (within a 25% tolerance band). These "pure hedges" tend to be significantly larger than other CDS positions, in particular when covering a risky sovereign issuer, pointing to a limited but existing role for hedging. Other covered CDS positions on the buy side may also serve as partial hedges (30% of sovereign CDS, 10% of corporate CDS) or over-hedges (between 10% and 14% of all CDS positions).

The very small share of CDS that appear to be used exclusively for hedging the full market exposure of a bond raises question as to the primary purpose of CDS, especially on the corporate side, and therefore the motivation behind their use by UCITS fund managers. This, combined with the existence of net sell CDS exposure, should raise supervisory concerns from both an investor protection and financial stability risk perspective, especially in a high-volatility environment.

[23] The banking sector being the only counterpart to funds using CDS - see, for reference, Guagliano and Mazzacurati (2018).

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Annex

Table A.1 – UCITS fund sample

Fund type	Full sample			CDS users		
	Number of funds	Total net assets (EUR billion)	Average net assets (EUR million)	Number of funds	Total net assets (EUR billion)	Average net assets (EUR million)
Equity	6,484	2,194	342	17	6	355
Allocation	5,133	1,030	206	242	248	1,034
Fixed income	4,405	1,769	406	1,003	789	793
Alternative	1,410	369	278	231	167	733
Miscellaneous	719	63	91	42	4	97
Money market	353	878	2,517	5	1	1,389
Convertible	193	58	302	9	3	371
Rest	152	15	178	8	2	355
Full sample	18,849	6,376	346	1,557	1,220	797

Table A.2 – Fund families

Fund family size	Number of families	Number of funds	Total net assets (EUR billion)	Average family assets (EUR billion)	Average fund assets (EUR million)
Tier 1	15	3,854	2,377	257	617
Tier 2	21	2,360	1,464	70	620

Table A.3 – Net CDS exposure size

CDS exposure side	Number of funds	Aggregate net exposure (EUR billion)	Average net exposure (EUR million)	Median net exposure (EUR million)
Net buy	699	761	108.8	21.0
Net sell	635	1,396	219.9	19.5
Neutral (=0)	25	0	0	0

Table A.4 – CDS ratings and portfolio ratings

Credit ratings	Average CDS issuer rating	Median CDS issuer rating	Average fund portfolio rating	Median fund portfolio rating
Fixed Income funds	12.4	13.0	12.4	13.0
Alternative funds	12.5	13.0	12.5	12.9

Note: Numeric values between 12.33 and 13 correspond to a BBB rating

Table A.5 – Covered and uncovered CDS positions

	Covered		Uncovered	
	Number of positions	**Net CDS notional** (EUR mn)	**Number of positions**	**Net CDS notional** (EUR mn)
Fixed Income funds				
Buy	361	4,941	980	6,307
Sell	588	3,885	1,043	6,024
Alternative funds				
Buy	131	575	577	3,391
Sell	95	889	288	1,047
Total	1,175	10,290	2,888	16,769

Table A.6 – CDS coverage ratio (buy-side net CDS exposure only)

	Corporate CDS		Sovereign CDS	
	Average	**Median**	**Average**	**Median**
Including naked CDS				
Fixed Income funds	0.66	0.00	0.98	0.02
Alternative funds	0.37	0.00	0.81	0.00
Excluding naked CDS				
Fixed Income funds	2.40	0.99	1.86	0.47
Alternative funds	2.25	1.06	2.35	0.56


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